The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

USA

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I also certify that the attached copy of the request for grant of a Patent (Form 1/77) bears an amendment, effected by this office, following a request by the applicant and agreed to by the Comptroller-General.

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Signed

Dated 1 October 2003

Patents Form 1/77

Patents Act 1977
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The Patent Office

1/77

28OCT02 E759698-1 D02246
P01/7700 0.00-0224894.6

THE PATENT OFFICE
B
25 OCT 2002
LONDON

# Request for grant of a patent

*(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)*

The Patent Office

Cardiff Road
Newport
South Wales
NP10 8QQ

1. Your reference

P015518GB MJH

2. Patent application number
*(The Patent Office will fill in this part)*

0224894.6

25 OCT 2002

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

MELLES GRIOT LIMITED
16 ~~Stratford Place~~
~~London W1N 9AF~~
~~United Kingdom~~

3rd Floor, MEDICI COURT
64-69 NEW BOND STREET
LONDON W1S 1DF
AS PER. ~~624322002~~

Patents ADP number *(if you know it)*

If the applicant is a corporate body, give the country/state of its incorporation

United Kingdom

4. Title of the invention

OPTICAL TABLES

5. Name of your agent *(if you have one)*

D Young & Co

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

21 New Fetter Lane
London
EC4A 1DA

Patents ADP number *(if you know it)*

59006

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

| Country | Priority application number *(if you know it)* | Date of filing *(day / month / year)* |
|---|---|---|
| NONE | | |

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

| Number of earlier application | Date of filing *(day / month / year)* |
|---|---|
| | |

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

*a) any applicant named in part 3 is not an inventor, or*
*b) there is an inventor who is not named as an applicant, or*
*c) any named applicant is a corporate body.*
*See note (d))*

Yes

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

| | |
|---|---|
| Continuation sheets of this form | 0 |
| Description | 6 |
| Claim(s) | 2 |
| Abstract | 1 |
| Drawing(s) | 1 + 1 |

10. If you are also filing any of the following, state how many against each item.

| | |
|---|---|
| Priority documents | 0 |
| Translations of priority documents | 0 |
| Statement of inventorship and right to grant of a patent *(Patents Form 7/77)* | 3 |
| Request for preliminary examination and search *(Patents Form 9/77)* | 1 |
| Request for substantive examination *(Patents Form 10/77)* | 1 |
| Any other documents *(please specify)* | 0 |

11. I/We request the grant of a patent on the basis of this application.

Signature D Young & Co Date 25 October 2002

D Young & Co (Agents for the Applicants)

12. Name and daytime telephone number of person to contact in the United Kingdom — Dr Miles Haines — 023 8071 9500

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Patents Form 7/77

Patents Act 1977
(Rule 15)


7/77

# Statement of inventorship and of right to grant of a patent

The Patent Office

Cardiff Road
Newport
South Wales
NP10 8QQ

| | | |
|---|---|---|
| 1. Your reference | P015518GB MJH | |
| 2. Patent application number *(if you know it)* | 0224894.6 | 25 OCT 2002 |
| 3. Full name of the or of each applicant | MELLES GRIOT LIMITED | |
| 4. Title of the invention | OPTICAL TABLES | |
| 5. State how the applicant *(s)* derived the right from the inventor *(s)* to be granted a patent | By virtue of employment. | |
| 6. How many, if any, additional Patents Forms 7/77 are attached to this form? *(see note (c))* | None | |
| 7. | I/We believe that the person *(s)* named over the page *(and on any extra copies of this form)* is/are the inventor *(s)* of the invention which the above patent application relates to. Signature D Young & Co Date 25 October 2002 D Young & Co (Agents for the Applicants) | |
| 8. Name and daytime telephone number of person to contact in the United Kingdom | Dr Miles Haines | 023 8071 9500 |

**Notes**

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*b) Write your answers in capital letters using black ink or you may type them.*

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Enter the full names, addresses and postcodes of the inventors in the boxes and underline the surnames

Surname: SARGEANT

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---

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Patents ADP number *(if you know it)*: 8492351001

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Surname:

First Names:

Patents ADP number *(if you know it)*:

**Reminder**

**Have you signed the form?**

## TITLE OF THE INVENTION

OPTICAL TABLES

## BACKGROUND OF THE INVENTION

The invention relates to optical tables and their manufacture.

Optical tables provide platforms for mounting components in a wide variety of optical applications. Although developed for optical applications, optical tables also now find applications outside the optical field.

Figure 1 shows schematically in cross-section a current design of optical table. An optical table is usually mounted on legs designed to provide vibration isolation, often with pneumatic damping. The table is formed from a steel top skin 10 separated from a steel bottom skin 12 by a steel core 14 encased in side walls 16. The top skin 10 has a two-dimensional grid of standard threaded holes 18, most commonly M6, spaced apart by a grid spacing of 25 or 50 mm. Equivalent Imperial dimension tables are also used, especially in the United States. In early designs, the top skin was directly bonded to the formed steel core. Some tables still use such a design for cost reasons. However, modern designs provide spacing under the top skin to prevent threads of components mounted on the table impinging directly on the core. To effect this, the illustrated design provides a so-called midskin 20 placed a short distance below the top skin 10 and secured to the steel side walls 16. Steel sealing cups 22 are arranged between the midskin 20 and topskin 10 to provide greater structural rigidity and to prevent liquid ingress to the main structure.

The tables are manufactured, by the applicant company, by bonding the various skins, core and sidewalls together in a high temperature press using hot cure adhesives. Tables are available in different thicknesses, the thickness variation being accommodated by varying the core thickness. Example tabletop thicknesses are 210 mm, 310 mm and 460 mm. Example table lateral dimensions range from 0.75 x 2 m to 1.5 x 6 m.

Other designs use alternatives to formed steel cores, such as honeycomb aluminium cores or composite cores.

Thick optical tables are sometimes demanded to provide greater rigidity which is necessary for large area tables or for superior vibration isolation properties. However, it is difficult to make tables thicker than around the 310 mm size referred to above. This is because the core is difficult to manage and is prone to tilting over. This is because the core is made up of a number of sheets that are stacked vertically like books on a shelf and are able to tilt over from the desired vertical stacking prior to completion of bonding.

## SUMMARY OF THE INVENTION

The invention provides a very simple solution to the manufacturing problem of making thick optical tables. The solution adopted is to manufacture individual table units according to standard procedures and then bond them together to make a thicker table.

Accordingly the invention provides a method of manufacturing an optical table comprising: making at least two subassemblies, wherein each subassembly is made by bonding a core to upper and lower skins; and bonding the subassemblies together to form the optical table.

The invention therefore provides an optical table comprising in height order: a top skin, an upper core, an intermediate skin, a lower core and a bottom skin, wherein the intermediate skin will typically comprise two sheets bonded together, namely the upper skin of a lower subassembly bonded to the lower skin of a subassembly above it.

A spacer layer may be arranged under the top skin separated from the upper core by a midskin as in the prior art, for example to provide room for peanuts to be attached to the underside of the top skin.

The core can be made of a formed steel core or other suitable material such as composite or aluminium honeycomb.

The invention allows a thick table to be made in a simple way, avoiding the manufacturing difficulties associated with thick cores. For example, the table may have a thickness from top skin to bottom skin in excess of at least one of 310, 460 and 600 mm. Each subassembly can be thin enough to avoid manufacturing difficulty, for example each subassembly may have a thickness less than at least one of 350 mm, 300 mm and 250 mm. As well as avoiding manufacturing difficulty, the invention allows different table thicknesses to be produced from a stock of subassemblies of the same thickness, or of a limited number of different thicknesses, by bonding 2, 3, 4 or conceivably more subassemblies together.

The bonding between the subassemblies can be performed using a cold cure adhesive, such as Permabond E32 (TM) or other two-component epoxy resin, thereby avoiding further use of a hot press. Alternatively, the bonding between the subassemblies could be performed using a hot cure adhesive. Moreover, the subassemblies could be non-adhesively bonded together, for example by welding them together.

In any case an optical table is formed of at least two subassemblies bonded together, each subassembly comprising a core bonded to upper and lower skins, wherein the lower skin of one subassembly is bonded to the upper skin of another subassembly arranged below it.

## BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the invention and to show how the same may be carried into effect reference is now made by way of example to the accompanying drawings in which:

Figure 1 shows schematically in cross-section a prior art optical table;

Figure 2 shows schematically in cross-section an optical table according to an embodiment of the invention; and

Figure 3 shows an optical table system using the optical table of Figure 2.

## DETAILED DESCRIPTION

Figure 2 shows schematically in cross-section an optical table 100 according to an embodiment of the invention. The table 100 is made of two subassemblies A and B which are bonded together, with subassembly A on top of subassembly B.

Subassembly A is identical to the prior art table illustrated in Figure 1. Namely, a steel top skin 110 is separated from a steel base skin 116 by a core 114 of steel honeycomb encased in steel side walls 112. The top skin 110 has a two-dimensional grid of standard threaded holes 118, most commonly M6, spaced apart by a grid spacing, typically of 25 or 50 mm. Equivalent Imperial dimensions could also be used, i.e. 1/4 inch thread at 1 inch or 2 inch pitch. A so-called midskin 120 is provided a short distance below the top skin 110 and secured to the steel side walls 112. Steel sealing cups 122 are arranged between the midskin 120 and topskin 110 to prevent liquid ingress into the table structure.

Subassembly B is similar in form to a primitive optical table in which the top skin is directly bonded to the honeycomb steel core. Namely, subassembly B comprises a top skin 130 and bottom skin 134 that both directly bond to a core 136 encased in side walls 132. Although this is similar to a primitive optical table, there is of course no provision of tapped holes on the top skin 130.

Subassemblies A and B are first manufactured using a conventional hot press. The completed subassemblies are then bonded together using a conventional cold cure adhesive, such as an epoxy resin adhesive, to form a bond 125 between skins 116 and 130, i.e. by bonding the upper face of subassembly B to the lower face of subassembly A. The upper subassembly can be lowered onto the lower subassembly using a hoist after applying a layer of adhesive to the top skin of the lower subassembly. After drying, the seam formed by the bond is then cleaned up and finished using standard techniques.

The manufactured optical table thus comprises in height order: a top skin 110, an upper core 114, an intermediate skin 116/130, a lower core 136 and a bottom skin 134.

Figure 3 shows in perspective an optical table system incorporating the optical table of Figure 2. The optical table 100 is supported by four vibration isolation mounts 105 which are generally cylindrical in shape and may incorporate pneumatic mountings, as is well known in the art.

It will be appreciated that many variations on this basic design can be made, for example as discussed in the above section entitled summary of the invention.

## CLAIMS

1. An optical table comprising in height order: a top skin, an upper core, an intermediate skin, a lower core and a bottom skin.

2. An optical table according to claim 1, wherein the intermediate skin comprises two sheets bonded together.

3. An optical table according to claim 1, further comprising a spacer layer arranged under the top skin and separated from the upper core by a midskin.

4. An optical table according to claim 1, 2 or 3, wherein the core is made of formed steel.

5. An optical table according to claim 1, 2 or 3, wherein the core is composite.

6. An optical table according to claim 1, 2 or 3, wherein the core is aluminium honeycomb.

7. An optical table according to any one of the preceding claims, wherein the table has a thickness from top skin to bottom skin in excess of at least one of 310, 460 and 600 mm

8. An optical table according to any one of the preceding claims, wherein each subassembly has a thickness less than at least one of 350 mm, 300 mm and 250 mm.

9. An optical table system comprising an optical table according to any one of the preceding claims arranged on a plurality of supporting legs.

10. A method of manufacturing an optical table comprising:

making at least two subassemblies, wherein each subassembly is made by bonding a core to upper and lower skins; and

bonding the subassemblies together to form the optical table.

11. A method according to claim 10, wherein the bonding between the subassemblies is performed using a cold cure adhesive.

12. A method according to claim 10, wherein the bonding between the subassemblies is performed using a hot cure adhesive.

13. An optical table formed of at least two subassemblies bonded together, each subassembly comprising a core bonded to upper and lower skins, wherein the lower skin of one subassembly is bonded to the upper skin of another subassembly arranged below it.

## ABSTRACT

## OPTICAL TABLES

The invention provides a very simple solution to the manufacturing problem of making thick optical tables which are needed for some applications. The solution adopted is to manufacture individual units according to standard procedures for making optical tables and then to bond them together to make a thicker optical table. Accordingly the invention provides a method of manufacturing an optical table (100) comprising making two or more subassemblies (A, B), wherein each subassembly is made by bonding a core to upper and lower skins, and then bonding the subassemblies together to form the optical table. The optical table (100) can be conventionally mounted on vibration isolation supports (105).

Figure 3

Fig. 1

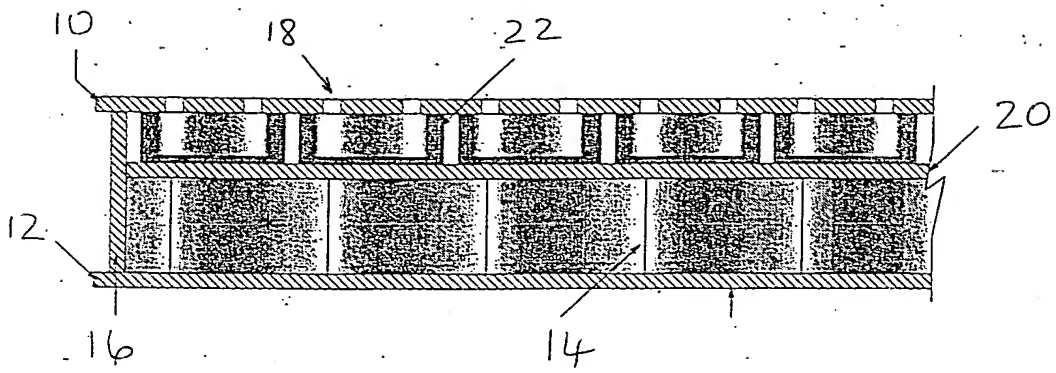


Fig 2

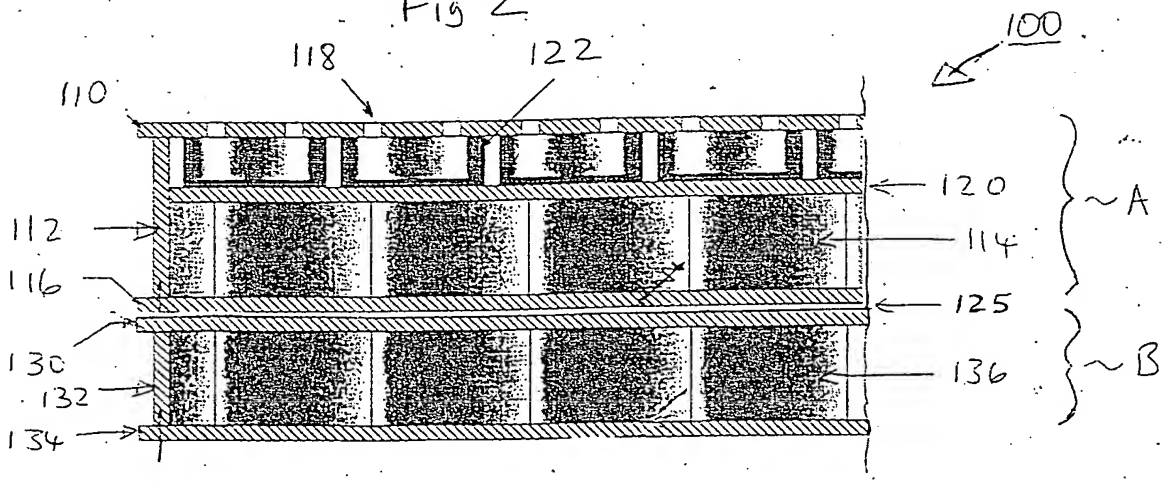


Fig. 3